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AUTHOR Marsh, Herbert W.
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ABSTRACT

Marsh and Parker (1984) described the big-fish-little-pond effect (BFLPE) whereby equally able students have lower academic self-concepts in high-ability schools than in low-ability schools. The present investigation, a reanalysis of the Youth in Transition data, supported the generality of the earlier findings and demonstrated new theoretical implications of the BFLPE. First, differences in the academic self-concepts of black and white students, sometimes assumed to represent response biases, were explicable in terms of the BFLPE. SEcond, equally able students earned higher grades in lower-ability schools. This frame-of-reference effect for grades was distinct from, but contributed to, the BFLPE for academic self-concept. Third, a longitudinal analysis demonstrated that academic self-concept had a direct effect on subsequent school performance beyond the effects of academic ability and prior school performance. About one-quarter of this effect could be explained in terms of the BFLPE. Six pages of references, tabulated data, and the models showing the cause-effect relationship of various factors follow the report. (Author/JAZ)

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The Big-Fish-Little-Pond Effect on Academic Self-concept

Herbert W. Marsh

The University Of Sydney

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The Big-Fish-Little-Pond Effect on Academic Self-concept

Abstract

Marsh and Parker (1984) described the big-fish-little-pond effect (BFLPE) whereby equally able students have lower academic self-concepts in high-ability schools than in low-ability schools. The present investigation, a reanalysis of the Youth in Transition data, supported the generality of the earlier findings and demonstrated new theoretical implications of the BFLPE. First, differences in the academic self-concepts of black and white students, sometimes assumed to represent response biases, were explicable in terms of the BFLPE. Second, equally able students earned higher grades in lower-ability schools. This frame-of-reference effect for grades was distinct from, but contributed to, the BFLPE for academic self-concept. Third, a longitudinal analysis demonstrated that academic self-concept had a direct effect on subsequent school performance beyond the effects of academic ability and prior school performance. About one-quarter of this effect could be explained in terms of the BFLPE.

The Big-Fish-Little-Pond Effect on Academic Self-concept

General Self-concept, Academic Self-concept and Academic Performance.

The separation of academic and general self-concepts. Historically, self-concept research has emphasized a general, overall or total self-concept, and specific facets such as academic self-concept have been relegated to a minor role. More recently, self-concept theory (e.g., Byrne, 1984; Shavelson, Hubner & Stanton, 1976) has emphasized the multidimensionality of self-concept, and empirical studies have clearly identified distinct, a priori facets of self-concept (e.g., Boersma & Chapman, 1979; Dusek & Flaherty, 1981; Fleming & Courtney, 1984; Harter, 1982; Marsh, 1986; Marsh, Smith, Barnes & Butler, 1983; Marsh, Barnes, Cairns & Tidman, 1984; Marsh, Barnes & Hocevar, 1985; Soares & Soares, 1982). In a review of this research, Marsh and Shavelson (1985) concluded that: a) external criteria will be more strongly correlated with the specific facets of self to which they are most logically/theoretically related than to broad, general measures of self-concept; b) the demonstration of such a pattern of results across a variety of external criteria provides support for the multidimensionality of self-concept and its construct validity; c) the relations between self-concept and other constructs cannot be adequately understood if this multidimensionality is ignored. Support for these contentions was particularly strong for academic self-concept and its relation to academic achievement.

Findings from other literature reviews are also generally consistent with the Marsh/Shavelson contentions. Wylie's 1979 review and Hansford and Hattie's 1982 meta-analysis showed that academic achievement was substantially more correlated with academic self-concept than with general self-concept. Marsh (1986, in press) reported that verbal and mathematics

achievements were substantially correlated with Verbal and Math self-concepts respectively, less correlated with other areas of academic self-concept, and nearly uncorrelated with nonacademic facets of self-concept. On the basis of within-network studies that examined the internal structure of self facets, and of between-network studies that related self-facets to external criteria, Byrne (1984) concluded that self-concept is a multidimensional construct, having one general facet and several specific facets, one of which is academic self-concept.

The differential effects of academic ability and performance on academic self-concept. Wylie (1979) posited that since students' self-perceptions of their academic ability are typically based on school performance, ability measures should add little to the prediction of self-concept beyond that of achievement indices such as grade point average (GPA). This also implies that variables like academic motivation and effort that affect school performance independent of academic ability should affect academic self-concept, though such effects may be mediated through school performance. Consistent with this proposal Wylie's 1979 review and Hansford and Hattie's 1982 meta-analysis found that school performance indicators were more highly correlated with self-concept than were standardized measures of IQ or tests of general academic achievement.

Davis (1966) made an important distinction between GPA and academic ability that may also affect their relations with academic self-concept. In a review of college-level studies he concluded that because schools all tend to "grade on a curve," school-average ability and GPA are independent of each other even though both are related to individual ability. Hence, once the effect of individual ability is controlled, school-average ability and GPA will be negatively correlated. This means that equally able students are

likely to have higher GPAs in low-ability schools than in high-ability schools. This frame-of-reference effect of school-average ability on GPA is likely to influence academic self-concept through GPA because GPA is a primary determinant of academic self-concept. Standardized ability tests provide a broadly based measure that is reasonably independent of the immediate context, whereas GPA provides a measure of relative standing within a particular school that is relatively independent of the average ability of students in that school. Because GPA and academic ability easures reflect a different basis of comparison, their respective relations to academic self-concept may be particularly complicated for older students who probably can assess themselves relative to both.

A causal ordering of academic performance and self-concept. Byrne (1984) noted that interest in academic self-concept stems not only from the way academic performance is reflected in academic self-concept, but also from the belief that it has motivational properties such that changes in academic self-concept will lead to subsequent changes in academic performance. Hence, Byrne examined evidence for a causal ordering or causal predominance between academic self-concept and academic achievement. She cited three prerequisites of such studies: a) a statistical relationship must be established; b) a clearly established time precedence must be established in longitudinal studies; and c) a causal model must be tested. However, she found few studies that met these criteria. Byrne indicated that no causal ordering of the two constructs had been established and suggested that the relation may be reciprocal. In conclusion she noted the theoretical and practical significance in establishing this causal ordering, and recommended causal studies that focus on diverse student populations and reference groups, that include other important variables such as

socioeconomic status (SES), IQ, and ethnicity, and that meet her three prerequisites for such studies.

Several recent studies (e.g., Byrne, 1986; Shavelson & Bolus, 1981; Maruyama, Rubin & Kingsbury, 1981; Newman, 1984) have tested causal models of the relation between academic self-concept and achievement. The Maruyama et al. study may be the weakest of these for this purpose because it did not specifically examine academic self-concept, and because it measured general self-concept at only one point in time (also see Marsh & Parker, 1984, for further discussion). The other three longitudinal studies specifically measured academic self-concept and academic achievement at least twice. The Byrne and the Newman studies used standardized achievement tests to infer academic achievement and found that prior academic self-concept had no causal influence on subsequent test scores. In contrast, Shavelson and Bolus used school grades to infer academic achievement and found that prior academic self-concept did have a causal influence on subsequent school grades. The influence of academic self-concept is posited to be motivational. Thus, academic motivation and effort are more likely to affect school grades than to affect standardized test scores. This suggests that the causal influence of academic self-concept will be stronger on school grades than on standardized measures of academic ability and may explain why only Shavelson and Bolus found a causal influence of academic self-concept.

Previous studies of the Youth in Transition data have not examined the influence of academic self-concept on subsequent achievement in a longitudinal analysis. However, the data appear to be well suited for this purpose according to Byrne's criteria and because subsequent achievement is inferred on the basis of school grades instead of standardized test scores. The BFLPE, because it affects academic self-concept, may affect school

grades and this possibility is explored. Other methodological issues specific to the Youth in Transition data are also examined in more detail.

Summary. In summary, previous research: provides clear support for the construct validity of academic self-concept and its separation from general and nonacademic self-concepts; posits the differential effects of GPA and academic ability on academic self-concept, suggesting that the effects of GPA will be stronger and more direct; but offers no clear evidence for the causal effect of academic self-concept on subsequent academic performance.

The Big-Fish-Little-Pond Effect (BFLPE).

The theoretical and empirical basis of the BFLPE.

Chapman and Volkman (1939), Kelley (1952), Festinger (1954), Rosenberg (1965), Sherif and Sherif (1969), Thibaut and Kelley (1957) and many others assert that group membership influences the values and standards of performance used by individuals in their self-evaluations. While there are many ways in which this can occur, the focus of the present investigation is on the frame of reference or standard of comparison that a group provides (see Kelley, 1952, for the distinction between normative and comparative functions of reference groups). Students, due to *de facto* or systematic selection processes, often find themselves in a school setting where the average ability of their classmates differs systematically from that of a larger, more representative norm group. The BFLPE occurs when equally able students have lower self-perceived academic skills and lower academic self-concepts when they compare themselves with more able students, and higher self-perceived academic skills and academic self-concepts when they compare themselves with less able students (Marsh, 1984b; 1984c; Marsh & Parker, 1984). However, the BFLPE is not the only plausible outcome. For example, being an average-ability student in a high-ability group of classmates may affect academic

self-concept such that it is: a) below average because the basis of comparison is the performance of above-average students (i.e., a BFLPE or contrast effect); b) above average by virtue of membership in the high-ability grouping (i.e., a reflected glory, group identification, or assimilation effect); or c) average because it is unaffected by the immediate context of the other students, or because "a" and "b" occur simultaneously and cancel each other.

The BFLPE is one specific example of more general frame-of-reference effects that have been studied in psychology (see Sherif & Sherif, 1969). In demonstrations of the BFLPE Marsh operationalized the standard of comparison to be the school-average ability level and this is consistent with more general models of frame-of-reference effects in psychophysics (e.g., Helson, 1964) and social psychology (e.g., Upshaw, 1969) though more complicated models have been posited (Marsh, 1974; 1983; Marsh & Parducci, 1978; Parducci & Perrett, 1971; Upshaw, 1969; also see Marsh, 1984c). Hence, within a single school or in a sample of schools where school-average ability is homogeneous, students will evaluate themselves according to the same standard of comparison (i.e., school-average ability will be constant) and so no BFLPE is expected (Marsh, 1984c). It is only when academic self-concepts are examined in schools where the school-average ability varies that the BFLPE is expected, and the size of the BFLPE is posited to vary according to how much the schools vary in school-average ability.

Davis (1966) posited a model similar to the BFLPE model in a study of the career aspirations of college men. He sought support for a theoretical explanation for why the academic quality of a college had so little effect on career aspirations. He proposed that attending a high-ability college would result in a poorer GPA independent of individual academic ability, and

that GPA influences self-evaluations and, subsequently, career decisions. Davis could not fully test his model because he had no individual measures of academic ability, but he did have dichotomous responses to the item "I have a flair for course work in this area" as an indicator of self-evaluations in eight subject areas, and a self-reported measure of GPA. Davis found that GPA was more strongly related to both career decisions and to "flair" than was school-average ability, and that "flair" contributed uniquely to career decisions. Davis (p. 31) concluded: "The aphorism 'It is better to be a big frog in a small pond than a small frog in a big pond' is not perfect advice, but it is not trivial."

The present operationalization of the BFLPE is most reasonable, and the BFLPE should be largest, in elementary schools. These young students may have no standard of comparison except for the performance of their classmates and may not even know how the average ability level of their classmates compares with a broader frame of reference. High school students typically have some basis for the assessment of their own academic skills that is independent of the performances of their classmates, often knowing how the average ability level of their classmates compares with some broader frame of reference (particularly when classes or schools are specifically streamed according to ability). In such a setting, the determination of the standard of comparison is likely to be more complex and BFLPE may be smaller, than when the standard of comparison is defined only according to the immediate context of ability levels (see Marsh, 1984b; 1984c). Nevertheless, Davis (1966) found evidence for a similar sort of frame-of-reference effect for university students and so the BFLPE should also exist at the high school level.

Empirical support for the BFLPE. The existence of the BFLPE has been

supported by research using a wide variety of different experimental and analytical approaches. Using path analysis, Marsh and Parker (1984) found that when individual ability level was controlled, school-average ability affected academic self-concept negatively; equally able students had lower academic self-concepts when they attended high-ability schools. Bachman and O'Malley (1986) found a similar effect in a path analytic study of high school students. Rogers, Smith and Coleman (1978) ranked a group of children in terms of academic achievement across the whole group and then in terms of their academic achievement within their own classroom (i.e., relative to their classmates rather than to the larger, more representative sample), and found that the within classroom rankings were more highly correlated with self-concept. Strang, Smith and Rogers (1978) tested the self-concepts of academically disadvantaged children who attended some classes with other disadvantaged children and other classes with nondisadvantaged children. These academically disadvantaged children were randomly assigned to experimental and control groups. The experimental group was given a manipulation to enhance the saliency of their membership in the regular classrooms with nondisadvantaged children, and these children reported lower self-concepts than their control group. Schwarzer, Jerusalem, and Lange (1983) examined the self-concepts of West German students who moved from nonselective, heterogeneous primary schools to secondary schools that were streamed on the basis of academic achievement. At the transition point students selected to enter the high-ability schools had substantially higher academic self-concepts than those entering the low-ability schools, but the two groups did not differ in academic self-concept by the end of their first year in the new schools. Path analyses indicated that the direct influence of school type on academic self-concept was negative. In a meta-analysis of

studies of the effect of homogeneous ability grouping on self-concept, Kulik (1985; also see Kulik & Kulik, 1982; Marsh, 1984c) found that high-ability students tended to have lower self-concepts, and low-ability students higher self-concepts, when placed in streamed classes of students with similar abilities than did ungrouped comparison groups. In summary, each of these studies provides support for the BFLPE in that one's own academic self-concept is negatively related to the average performance of classmates.

Background For the Present Investigation.

The Marsh and Parker (1984) Study. The present investigation is based on the Marsh and Parker study. The initial purpose of that study was to replicate American studies (Soares & Soares, 1969; Trowbridge, 1970; 1972) that reported a paradoxically negative correlation between school-average SES and self-concept. Those researchers specifically selected schools that were known to be high or low in terms of SES and found that self-concepts were slightly higher in the low-SES schools than in the high-SES schools. Those studies, among the more frequently cited self-concept studies of that time, were important because they countered the prevalent assumption that disadvantaged children are likely to have substantially lower self-concepts. Wylie (1979) noted that black/white differences and SES differences are typically confounded in such studies and also those that examine racial differences in self-concept. Thus the results of these studies may also reflect black/white differences (see Bachman and O'Malley, 1984; Trowbridge, 1972).

In the Marsh and Parker study, as in these earlier studies, school-average SES was a dichotomous variable determined by specifically selecting schools in which the average SES was known to be high or low. The Marsh-Parker results replicated the earlier findings in that this dichotomous

school-average measure of SES was negatively related (albeit slightly as the correlations were only about -.1 in each of the studies) to a total self-concept measure. Academic self-concept was not significantly correlated with school-average SES in the Marsh and Parker study (but see Trowbridge, 1972), but once the effects of family SES and academic ability were controlled, the negative effect of the school-average measure (-.36) was much larger and specific to academic self-concept. Due in part to the sampling design of the study, school-average indicators of ability and SES were so highly correlated that their respective effects could not be disentangled. Thus the authors could not establish whether the effects of school-average ability were more important than school-average SES even though this is implied by their frame-of-reference model. Marsh and Parker concluded that the earlier studies had seriously underestimated the negative effect of attending a high-ability school on academic self-concept and formulated their frame of reference model to describe the BFLPE (also see Marsh, 1984b; 1984c).

The BFLPE is posited to be specific to academic self-concept, and so it does not explain the uncorrected negative correlation between total self-concept and school-average SES found by Soares and Soares (1969) and by Trowbridge (1970; 1972), and replicated by Marsh and Parker (1984). Furthermore, even if the frame of reference were completely determined by classmates in the immediate school context, then the average self-concept should be the same in each school so that the correlation would be zero. Similarly, frame-of-reference models used to explain why blacks do not have lower esteem than whites (e.g., Porter & Washington, 1979) cannot explain why blacks have <u>higher</u> esteem scores than whites. What is predicted on the basis of the BFLPE is that once the correlation between academic self-concept and school-average ability is corrected for individual ability, then

being in a high-ability school will affect academic self-concept negatively.

Bachman and O'Malley (1977, 1986). Marsh and Parker (1984) contrasted their study with the Bachman and O'Malley's 1977 study that examined relations between esteem, SES, academic ability, and GPA in a large representative sample of boys from 87 high schools. Bachman and O'Malley's results were, perhaps, disappointing to self-concept researchers in that the direct effects of SES, academic ability, and GPA on self-esteem were modest. Marsh and Parker argued that their own path model and the one used by Bachman and O'Malley (1977) were similar -- except for the separation of self-concept into academic and nonacademic components and for the inclusion of school-average measures -- but that the results of the two studies were strikingly different. For two separate reasons Marsh and Parker proposed the reanalysis of that Youth in Transition Data that is presented in the present investigation -- a reanalysis that includes school-average indicators of SES and ability and that includes a measure of academic self-concept that was collected as part of the Youth in Transition Project but not included by Bachman and O'Malley. First, such a reanalysis would provide a test of the generality of the BFLPE with a representative sample of high school students and provide a better basis for understanding the effect. Second, it would provide a test of Bachman and O'Malley's finding that academic ability and achievement had only weak effects on self-concept against the alternative hypothesis that ability and achievement have substantial effects on academic self-concept but not on global self-esteem.

In response to Marsh and Parker's proposal Bachman and O'Malley (1986) reanalyzed their Youth In Transition data, and their reanalysis generally supported both of Marsh and Parker's contentions. In support of the construct validity of academic self-concept, Bachman and O'Malley found that

academic ability and GPA were substantially correlated with academic self-concept but not with esteem. Consistent with the BFLPE Bachman and O'Malley found that the correlations between school-average ability and academic self-concept were low-negative when corrected for individual ability and SES (betas of about - .1, $p < .001$). However, their BFLPE was substantially smaller than that reported by Marsh and Parker (1984).

Distinctive features of the present investigation. The following are major distinctions between the present investigation and previous studies of the BFLPE or the Youth in Transition data:

1) The frame-of-reference model used to explain the BFLPE predicts that the size of the effect will vary according to the variability of school-average ability. For example, Bachman and O'Malley (1986) limited their analysis to white students in schools where most students were white, excluding all nonwhite students and all students in schools where students were primarily nonwhite. The variability of school-average ability was substantially smaller in that subsample than for the entire Youth in Transition sample, and so the model predicts that the BFLPE should be substantially smaller in that subsample than for the total group. In the present investigation the entire sample as well as separate subsamples including the one considered by Bachman and O'Malley are considered in order to test this prediction. Support for this prediction would provide further support for the frame-of-reference model and also help explain why the BFLPE was so small in Bachman and O'Malley's study. Furthermore, differences in the academic self-concepts of white and black students that are sometimes posited to represent response biases may also be explicable in terms of this same model.

2) Marsh (1984c) and Bachman and O'Malley (1986) described the BFLPE

in terms of school-average ability, but did not differentiate between the effects of school-average SES and ability. In contrast, Soares and Soares (1969) and the Trowbridge (1970, 1972) emphasized school-average SES. Furthermore, Trowbridge (1972; also see Soares & Soares, 1969) argued that children in low-SES schools, compared with those in higher-SES schools, had lower academic aspirations, had less expected of them academically by significant others, and were less likely to internalize academic failures, thus providing a theoretical basis for the negative effect of school-average SES on academic self-concept. Alwin and Otto (1977), reviewing studies of the effects of school context variables on aspirations to attend college rather than academic self-concept, suggested that when school indicators of both SES and ability are considered simultaneously, the effect of school ability is negative while the effect of school SES is positive. Because of this apparent controversy the school-average effects of both SES and academic ability are considered here.

3) An important distinctive feature of the present investigation is the longitudinal analysis of academic ability, academic self-concept, GPA, and school-average variables in one year on subsequent school performance and academic self-concept in the second year of the study. This longitudinal analysis examines the effect of academic self-concept on subsequent academic performance, and of the impact of the BFLPE in the first year on self-concepts and school performance in the second year. This longitudinal analysis is particularly important because this is apparently one of the few studies that satisfies Byrne's (1984) criteria for the study of the causal ordering of academic self-concept and achievement, and because this causal ordering has important implications for the interpretation of the BFLPE.

Method

Sample, Procedures, and Selection of Cases

Data come from the commercially available longitudinal data file that comprises selected measures from Times 1 - 4 of the Youth in Transition Study (Bachman, 1975). Five subgroups that comprise the total sample of 2213 students surveyed at Time 1 are considered; white students in all-white schools (n=1080), white students in mixed schools (n=832), black students in all-black schools (n=169), black students in mixed schools (n=87), and "others" (n=45). As in Bachman and O'Malley (1986) 214 of 1886 students from time 2 were excluded because subjects had either dropped out of school or changed schools between Times 1 and 2. For Time 1 measures there are almost no missing values for any of the measures described below and there are even fewer missing values for the 1672 cases selected for Time 2 analyses.

Measures and Time of Collection.

The particular variables used to represent SES, academic ability, and academic self-concept were chosen by Bachman (1970) from a more extensive set of variables collected as part of Youth in Transition Data. For example, there were other academic ability indicators and self-report measures related to academic self-concept that were not used. Bachman (1970) provided a rationale for his selection and this is the way these constructs have been defined in subsequent studies based on this data (e.g., Bachman & O'Malley, 1977; 1986). In unreported analyses I found that the inclusion of additional indicators of the constructs considered here had little or no impact on the results of the present investigation. For this reason, and in order to make the results as comparable as possible to other studies of the Youth in Transition data, I used Bachman's original operationalization of these constructs.

Socioeconomic status (SES). (Time 1 only) This is a composite of of six indicators: status of father's occupation, father's education, mother's education, a check list of possessions in the home, number of books in the home, and the ratio of rooms per person in the home (see Bachman, 1970, Appendix B, for a detailed presentation of the specific indicators and the theoretical rationale for the composite measure). It, as were other measures described below, was standardized (Mn = 50, SD = 10) for purposes of the present investigation. The school-average SES measure was then determined by computing the average SES separately for each of the 87 schools on the basis of the entire set of 2213 cases, and then assigning to each student the school-average SES of his school.

Academic ability. (Time 1 only) Academic ability was defined to be the unweighted average of the nonmissing scores for three ability tests after each set of test scores had been standardized: Quick Test (Ammons & Ammons, 1962); Gates Test of Reading Comprehension (Gates, 1958); General Aptitude Test Battery -- Part J, Vocabulary (1962). The total scores were then standardized (Mn=50, SD=10) and school-average ability was defined in the same way as school-average SES.

GPA. (Times 1 & 2). At Times 1 and 2 students were asked "What is the average grade in your classes last year?" during an individual interview conducted by a trained interviewer working for the Youth in Transition Project. For the present investigation these scores were standardized (Mn = 50, SD = 10) across all respondents at Time 1 and again at Time 2.

Academic Self-Concept. (Times 1 & 2). Students were asked to rate themselves in comparison with others of their own age on in their grade in school in terms of overall school ability, reading ability, and intelligence (see Bachman, 1970, pp. 91-103 for the wording of the items and a

theoretical rationale for the measure). For example, students were asked "How do you rate yourself in school ability compared with those in your grade in school" and "How intelligent do you think you are, compared with others your age." In the present investigation this measure consisted of an unweighted average of the nonmissing scores for the three self-ratings after responses to each had been standardized. The total scores for Time 1 and for Time 2 were then standardized separately (Mn = 50, SD = 10)..

Esteem.. (Time 1 & 2). This is the composite measure used by Bachman and O'Malley (1977; 1986) that consists of 10 items adapted from Rosenberg's (1965) self-esteem scale. Example items are: "I am able to do things as well as most other people" and "Sometimes I think I am no good at all" (see Bachman, 1970, p. 124, for the wording of the items and a theoretical rationale for the measure). Scores were standardized (Mn = 50, SD = 10) separately for Times 1 and 2.

Preliminary Analyses.

A oneway ANOVA was conducted to determine differences among the five subgroups on each of the study variables (Table 1). The groups differ substantially on SES and ability and on the school-average indicators of these variables. However, differences between the groups were small or not statistically significant for GPA, esteem, and academic self-concepts; group differences accounted for no more than 1% of the variance in each of these variables. A similar set of oneway ANOVAs was conducted in which each of the 87 schools served as the grouping variable, and again group differences were large for SES and ability but not for GPA, esteem and academic self-concept. These findings provide preliminary support for the proposed frame-of-reference effects in that groups differing substantially in terms of academic ability do not differ substantially in terms of self-concept

variables and GPA.

Insert Table 1 About here

A series of three-way ANOVAs, a 3 (levels of ability or SES) by 3 (levels of school-average ability or SES) by 2 (white vs. nonwhite students) was performed on the academic self-concept and esteem scores. In each of the analyses the effect of the school-average variable was negative and statistically significant, while the effect of the individual variables -- ability or SES -- was much stronger and positive. While these ANOVAs are not discussed in detail, it is important to note that none of the two-way or three-way interactions was statistically significant. Hence, the negative effect of being in a high-SES or a high-ability school on self-concept is reasonably similar for students of different ability levels, for students of different SES levels, and for white and nonwhite students. This is important because such interaction effects would complicate the path analyses to be considered and the lack of any substantial interaction involving race provides one justification for examining the total group rather than analyzing separate subgroups.

Whenever possible, the reliability of each study variable was also determined (see Table 2). Coefficient alpha estimates of reliability were determined for the measures of ability, SES and academic self-concept, and coefficient alphas for esteem were presented by Bachman and O'Malley (1977). Since GPA was based on a single response, internal consistency estimates of reliability could not be determined, but the test-retest correlation for GPA over the 18 month Time 1/Time 2 interval was .66. The reliability of the school average indicators depends on the reliability of the individual measures used to define them, but also on the number of students from each school used to estimate the school-average. Hence, the intraclass

correlation, based on a oneway ANOVA where groups consisted of the 87 schools considered in the study, was used to estimate the reliability of these school-average variables. The reliability estimates for all of the variables (Table 2) appear to be reasonable for purposes of this study. Even the academic self-concept variables, though based on responses to only three items, are moderately reliable and nearly as reliable as the esteem variables that are based on responses to 10 items.

Results

Correlations Among Study Variables.

The sets of correlations used for Time 1 analyses and for Time 2 analyses (Table 2) are similar, suggesting that the selection of cases for Time 2 analyses did not substantially influence the results. Consistent with expectations from Marsh and Parker (1984), ability and GPA are substantially correlated with academic self-concept (r's about .5) and substantially less correlated with global esteem (r's about .2). This pattern of relations provides strong support for the construct validity of academic self-concept and for the separation of academic self-concept and esteem.

Insert Table 2 About Here

School average ability and school average SES have a weak positive correlation with academic self-concept for the total group (Table 2). An examination of these correlations for each subgroup (not shown) revealed that while these correlations were not always positive, they were seldom significantly negative. Hence, the findings provide no support for the contention that the students in low-ability or low-SES schools have significantly higher self-concepts before correction for achievement scores than do students in high-ability or high-SES schools, as found by Soares and

Soares (1969), Trowbridge (1970; 1972), and Marsh and Parker (1984). The findings do, however, show that self-concepts in these different schools do not vary substantially even though school-average levels of ability and SES do differ substantially.

White students, compared with nonwhite students (see Table 2), have: significantly higher academic self-concepts, significantly higher GPAs, and nearly the same or slightly lower levels of esteem. However, each of these effects is very small (i.e., r's < .1). In contrast, white/nonwhite differences are much larger for academic ability test scores (r's = .43 and .42) and SES (r's = .25 and .26).

Davis (1966) proposed that GPA at the university level is influenced by a frame-of-reference effect like that proposed to explain the BFLPE, and findings from the present investigation indicate that this also occurs at the high school level. GPA did not vary much from school to school and did not differ substantially for subgroups that did differ substantially in terms of academic ability. GPA was only moderately correlated with ability (.43), very weakly correlated with school-average ability (.1), and negatively correlated with school-average ability once the effect of academic ability was controlled. Thus teachers apparently graded on a "curve" that was relatively independent of external standards -- one that was primarily determined by the immediate context of the ability levels of students in the school. Equally able students tended to have higher GPAs in low-ability schools than in high-ability schools.

This frame-of-reference effect of school-average ability on GPA is important in of itself and in relation to the BFLPE. Since a similar sort of frame-of-reference effect influences both GPA and academic self-concept, path models that contain both variables must be interpreted cautiously.

Controlling for GPA not only controls for an objective index of academic performance, but also controls for a frame-of-reference effect similar to the one that produces the BFLPE. Furthermore, since GPA is a primary determinant of academic self-concept, a frame-of-reference effect on GPA is likely to contribute to the BFLPE and this possibility is examined in the path analyses described below.

Path Models For Data From Time 1 and From Time 2.

The causal ordering in the first three path models (figure 1), and the description and analyses of the models follow Marsh and Parker (1984). The causal effects move from left to right as indicated by straight lines and are summarized with regression coefficients. Curved lines represent relations between pairs of variables where no causal ordering is hypothesized and are summarized with correlations or partial correlations. Nonsignificant paths are excluded but do appear in Appendix 1. In each of these models the critical features are the paths leading from academic ability to academic self-concept (labelled "p19" in Appendix 1), from GPA to academic self-concept (p13), and from school-average ability to GPA (p36) and academic self-concept (p16). It is predicted that path leading from GPA to academic self-concept (p13) will be substantial, that much of the effect of academic ability on academic self-concept will be mediated through GPA, that the paths from school-average ability to GPA and to academic self-concept will be negative, and that paths leading from ability, school-average ability, and GPA to esteem will be small. For each of the models, results for Time 1 based on all 2213 cases are presented as part of the path diagram (figure 1), while results computed separately for white students and for black students, and the corresponding three analyses of Time 2 data are presented in Appendix 1.

An important methodological consideration is whether path coefficients should be standardized or unstandardized regression coefficients. While a detailed discussion of the issue is beyond the scope of the present investigation, it is generally recommended (see Pedhazur, 1982) that: a) comparisons of the relative size of effects of different variables within the same group should be based on standardized coefficients; and b) comparisons of the effect of the same variable across different groups should be in terms of unstandardized regression coefficients. In the present investigation, all variables used in the path analyses, except for school-average SES and school-average ability, were standardized to have the same standard deviation across the entire sample. Thus the standardized and unstandardized coefficients for all but these two variables are the same for the total group analyses. Because of this, and because the focus of this study is on the relative contribution of different variables, standardized coefficients are presented. However, for the effects of the two school average measures that are used to infer the size of the BFLPE, both standardized and unstandardized coefficients are presented in Appendix 1. It should also be noted that all other standardized coefficients can be transformed into unstandardized coefficients as indicated by Pedhazur (1982). However, except for the school-average indicators, the two coefficients are almost always quite similar for the present investigation.

Insert Figure 1

Model 1. In model 1 family SES and school-average SES are related to the two self-concept scores. The direct effects of school-average SES on esteem and academic self-concept are negative, but very small. Inspection of the size of the path from school-average SES to academic self-concept, p14, for the six analyses summarized in Appendix 1 indicates that it was

never substantially negative and sometimes did not differ significantly from zero. Hence there is little support for a substantial negative impact of school-average SES on academic self-concept.

Model 2. In model 2, ability and school-average ability are related to the self-concept measures. The direct effect of ability on academic self-concept (.619) is substantial, while its impact on esteem (.278) is much smaller. Of particular relevance to the present study is the finding that the negative impact of school-average ability on academic self-concept (-.232) is substantial, and similar for Times 1 and 2. This path, p16, is much smaller in the separate analyses of responses by white students and by black students whether based on standardized or unstandardized coefficients (see Appendix 1). The standardized coefficient for the analysis of white students for Time 2 responses closely approximate the values that Bachman and O'Malley (1986) reported for their analyses of a similar subgroup. However, it is important to note that the corresponding unstandardized coefficient, though still smaller, more closely resembles the unstandardized coefficient for the total sample.

Model 3. In model 3, variables from models 1 and 2 are considered together along with GPA. Academic ability has a substantial direct effect on academic self-concept in addition to its substantial indirect effect through GPA, but its effect on esteem is much smaller. GPA also contributes positively to academic self-concept but has a smaller influence on esteem. Again, the negative influence of school-average SES is trivial while the negative effect of school-average ability -- directly and indirectly through its influence on GPA -- is much larger. Again, the effect of school-average ability is smaller in separate analyses of white and black subgroups.

The direct effect of school-average ability on academic self-concept in

model 3 is nearly the same as in model 2, but its total causal effect -- including the indirect effect through GPA (-.265 = -.229 + -.036) is larger. Thus there are two separate frame-of-reference effects that each contribute to the BFLPE. Students in low-ability schools compare themselves with less able students which leads to a higher academic self-concept. Students in low-ability schools earn higher grades than equally able students in high-ability schools and this also contributes to higher academic self-concepts. This second effect supports Davis's (1966) proposal and is consistent with the supposition that a variable that influences GPA will also influence academic self-concept.

The Longitudinal Path Analysis of Variables From Time 1 and 2.

In the longitudinal model 4 (figure 2) esteem, academic self-concept, and GPA collected at Time 2 are added to the Time 1 variables considered in model 3. The path estimates are based on the 1672 students considered in the Time 2 analyses, but the path coefficients relating the Time 1 variables differ little from those in figure 1 based on all 2213 students. However, the results for the Time 2 variables are quite different. For each of these three variables, the largest impact is from the same variable measured in the previous academic school year. Esteem from Time 1 is the only variable to have a substantial effect on Time 2 esteem, though academic self-concept from Time 1 and GPA from Time 2 also affect Time 2 esteem to a small extent. A wider variety of variables influence academic self-concept at Time 2. While the largest effect is from academic self-concept at Time 1 (.479), Time 2 GPA has a positive direct effect (.174), and Time 1 ability has a positive direct effect (.215) and indirect effects through GPA and academic self-concept from Time 1.

Insert Figure 2 About Here

The first reason for proposing this longitudinal analysis was to determine whether the BFLPE of school-average ability has a subsequent effect on academic self-concept at Time 2 beyond its effect on Time 1 academic self-concept. In interpreting these results it is important to note that the analysis is limited to students who did not change schools between Times 1 and 2 so that school-average ability remained constant. As expected, the school-average ability affects Time 2 academic self-concept indirectly through its effect on Time 1 variables, but the BFLPE of school-average ability has a new direct influence on Time 2 academic self-concept (-.097) in addition to these indirect effects. In contrast to the BFLPE, the frame-of-reference effects of school-average ability on Time 2 GPA are completely mediated through Time 1 variables.

The second reason for proposing this longitudinal analysis was to determine the causal influences of Time 1 academic self-concept on subsequent academic performance at Time 2. This analysis is particularly important because of its theoretical implications for self-concept research and for the BFLPE, and because this is apparently one of the few studies that meets the minimal requirements proposed by Byrne (1984). The critical path for this purpose is the statistically significant ($p < .001$) direct causal effect of Time 1 academic self-concept on Time 2 GPA. While the size of this path (.15) is only modest, it is important to realize that this effect is in addition to the substantial direct and indirect effects of academic ability and Time 1 GPA. In contrast, Time 1 GPA has no direct effect on Time 2 academic self-concept, perhaps suggesting the causal predominance of academic self-concept over school performance. However, the goal of trying to establish causal predominance when the effects are likely to be reciprocal may be dubious and a host of methodological issues

complicate such interpretations (Duncan, 1969; Kenny, 1979; Rogosa, 1978). It is also important to note that about a quarter of the causal influence of Time 1 academic self-concept on subsequent GPA can be explained in terms of the BFLPE of school-average ability. That is, attending a high-ability school produces a lower academic self-concept which subsequently produces poorer academic performance.

Discussion and Implications.

Theoretical Implications For The Study of Self-Concept.

The Role of General Esteem. Historically researchers have emphasized general self-concept, but more recently increased emphasis has been put on specific facets such as academic self-concept. In the present investigation academic ability and GPA had substantial effects on academic self-concept, but much smaller effects on global esteem (see Marsh & Shavelson, 1985, for similar results). Furthermore, academic self-concept had a modest effect on subsequent school performance while esteem had none. If the role of self-concept research is to better understand the complexity of self, to predict diverse behaviors, and to relate self-concept to other constructs, then specific facets of self will be more useful than a general facet.

The BFLPE. Marsh and Parker (1984), Bachman and O'Malley (1986), other research reviewed earlier, and the present investigation all show that the BFLPE of school-average ability negatively affects academic self-concept. Bachman and O'Malley (1986) and Marsh and Parker (1984) disagreed on the size of the BFLPE, but findings presented here show that this disagreement may be due to differences in the way that their samples were defined. If the variability in school average ability is increased by selecting schools that are extreme in terms of this variable as in Marsh and Parker (1984), then the size of the BFLPE will probably be larger than if based on the entire

population. In contrast, Bachman and O'Malley estimated the size of the BFLPE in a subsample that was less variable in terms of school-average ability than their total sample. As demonstrated in the present investigation, the BFLPE based on their truncated subsample substantially underestimated the size of the BFLPE relative to the estimate based on the total sample. It is important to emphasize that these differences are explicable on the basis of the same theoretical model that is used to explain the BFLPE, and thus provide further support for the model.

These complications make it difficult to establish the size of the BFLPE in any absolute sense, but they do illustrate that its size will depend on the particular application. If a parent is deciding whether to send their child to a mediocre or an academically elite school, the size of the BFLPE will be much larger in relation to this decision than a population estimate of the BFLPE. In contrast, if the decision is between two schools of similar ability, then the BFLPE will be small.

Marsh (1984b, p. 804) suggested the that the BFLPE would be smaller in a high school setting because the "older students have a broader perspective from which to evaluate their own academic ability -- one that is not so dependent on the abilities of other students in their own classroom." While this could account for why the BFLPE appears to be smaller in the present investigation than in Marsh and Parker (1984), the studies differ in so many ways that such comparisons may be dubious. However, the effects of GPA and academic ability tests on academic self-concept in the present investigation also seem consistent with this suggestion. GPA represents a within-school estimate of academic achievement, whereas the ability tests provide an estimate of achievement against a broader basis of comparison. The substantial contribution of the ability tests to academic self-concept

beyond the contribution of GPA suggests that the high school students in the present investigation have a broader basis for evaluating their academic self-concept than just their relative standing within their own high school. More rigorous tests of the proposed relation between the size of the BFLPE and age require a longitudinal study that spans preadolescent and adolescent years or at least a cross-sectional study that includes representative samples across this age range.

The Differential Effects of Academic Ability and GPA. The results of the present investigation provide insight into the distinction between academic ability and school performance, their respective influences on academic self-concept, and how this pattern of relations is affected by frame-of-reference effects. Earlier discussion suggested that most of the effect of ability on academic self-concept would be mediated by GPA, but this hypothesis was not supported. The direct effect of ability on academic self-concept (.399; Model 3 in Figure 1) was more than twice the size of its effect through GPA (.495 x .312 = .154) and larger than the direct effect of GPA (.312). Even in the longitudinal Model 4 ability continued to have a substantial direct effect on academic self-concept in addition to its indirect effects through GPAs from two previous school years and its indirect effect through the earlier measure of academic self-concept. This suggests that students do have a substantial basis beyond the information provided by GPA for inferring their academic ability levels, and that these external sources of inference become more accurate or stronger during the last few years of high school.

The results of the present investigation also demonstrated that a substantial frame-of-reference effect influences GPA independent of academic ability; equally able students have lower GPAs in high-ability schools than

in low-ability schools. This frame-of-reference effect is separate from, but contributes to, the BFLPE on academic self-concept.

Black-White differences in academic self-concept. Previous research suggests that black respondents have slightly higher levels of esteem than do white respondents, but has not clarified whether this difference represents black-white differences in response biases or valid group differences. In the present investigation blacks also had slightly higher levels of esteem, but slightly lower levels of academic self-concept (both differences were between .1 and .2 SD). Hence proposed explanations of black-white differences in esteem may not generalize to academic self-concept. This distinction is also important because, as noted earlier, frame-of-reference effects may explain why blacks do not have lower self-concepts than do whites but not why their self-concepts are higher than whites.

Blacks in the present investigation, particularly those in segregated schools, had substantially lower academic ability test scores than did white students. Thus, after correcting for academic ability, blacks had higher academic self-concepts than did whites even though their uncorrected academic self-concepts were lower. Hence the results may still be consistent with a response bias hypothesis, and this was apparently one basis for Bachman and O'Malley's decision to exclude blacks from their 1986 study. However, this is precisely the pattern of results that is predicted by the BFLPE. Blacks had academic ability test scores that were below average, but -- particularly in the segregated southern schools -- compared themselves to classmates who also had below average test scores. Thus, while their academic self-concepts were somewhat below average (due, perhaps, to self-perceptions that were independent of the immediate school context), they were not nearly as low as their ability test scores predicted (due to the

BFLPE). This explanation of black-white differences in terms of the BFLPE offers empirical support for a theoretical explanation that does not assume that responses by blacks or whites are biased or differentially affected by response styles, and clearly warrants further consideration.

It is also relevant to note that while blacks had ability test scores that were well-below average (1.3 SD) their GPAs were only slightly below average (.27 SD). As mentioned previously, this apparently reflects the tendency for schools to grade on a curve so that the school-average GPA does not vary substantially from one school to the next. GPA is the primary basis of feedback that students have about their academic ability, and certainly is a valid source of information for forming academic self-concepts. Hence, the academic self-concepts of black students approximately matches their school GPA, and this also supports the validity of their responses even though they may appear "unrealistic" in relation to ability test scores.

The causal effect of academic self-concept on subsequent school performance. Much of the interest in academic self-concept stems from the belief that changes in academic self-concept will lead to changes in subsequent academic performance, but there have been few methodologically sound demonstrations of this important causal link. In the present investigation academic self-concept at Time 1 (figure 2) had a modest causal impact on subsequent school performance at Time 2 beyond the substantial effects of academic ability and prior school performance. Furthermore, Byrne's (1984) methodological criteria were satisfied in that there was a statistically significant relation, the temporal ordering of the variables was well represented in model 4 at least with respect to Time 1 variables preceding Time 2 variables, and a causal model was tested. These findings are very important because of their theoretical significance to self-concept

theory, because this study is one of the few to demonstrate a causal effect of academic self-concept on school performance, and because this is one of the few to satisfy Byrne's (1984) criteria. It is also important to note that the BFLPE accounts for about one-quarter of the causal influence of academic self-concept on subsequent academic performance.

A potential problem with this conclusion that requires further consideration is that GPA was a self-report measure rather than an objective index. Thus it is possible that GPAs for Times 1 and 2 were distorted by self-report biases, and that a similar sort of bias affected academic self-concept responses. However, this potential problem would probably work against Time 1 academic self-concept having an impact on Time 2 GPA after controlling for the effect of Time 1 GPA, in that: a) the effect of Time 1 GPA on Time 2 GPA would probably be exaggerated since both would be similarly affected by such biases; b) the overlap between Time 1 GPA and Time 1 academic self-concept would probably be exaggerated since both were assessed at the same time; and c) the contribution of Time 1 academic self-concept to Time 2 GPA that was unique from the effect of Time 1 GPA would probably be underestimated since variance that could be explained by both would be exaggerated and would be attributed to Time 1 GPA. Hence this potential problem apparently does not undermine this theoretically important finding, even though causal inferences based on correlational data must always be viewed with caution.

There are other features of the present investigation that may bear on the interpretation of this causal link and future research. First, academic self-concept is likely to have more effect on GPA than on standardized measures of academic achievement that may be less susceptible to change due to motivational influences. Second, the effect of academic self-concept on

subsequent school performance was in addition to the effects of previous school performance and a composite of academic ability tests, and thus provides a more stringent test than one based on just school performance. Third, the longitudinal analysis was based on only students who remained in the same school so that their academic self-concept and GPA were not affected by a change in schools. Academic self-concept may have a larger impact on academic performance when students change academic settings such that their academic self-concept and their relative academic standing within the new setting are in conflict, and this creates a psychological disequillibrium (see Jerusalem, 1984; Marsh, 1984a). Fourth, the present investigation was based on a measure of total academic self-concept, an overall measure of GPA, and a composite of academic ability tests. If more specific measures were used, particularly mathematical and verbal indicators of each construct, then the effects of the self-concepts may be larger. Marsh (1986) demonstrated that Math and Verbal self-concepts are relatively uncorrelated even though academic performances in the two areas are substantially correlated, and so the motivational influences associated with each academic self-concept facet may also be quite distinct. For example, if my Math self-concept were higher than my Verbal self-concept, I would probably be more motivated to excel in mathematics classes than English classes, and this would be reflected in relatively better performance in Math classes and relatively poorer performance in English classes than would be predicted by academic ability scores. However, these differential effects would be cancelled when only overall measures are examined. Davis (1966) provided support for a similar proposal for the effects of self-concepts in different academic areas on career preferences of college students.

Practical Implications.

Marsh and Parker suggested that the results of their study have practical implications for parents who consider the possibility of placing their children in selective, high-ability schools, because this will apparently produce a lower academic self-concept. At least for some children the early formation of a self-image of themselves as a poor student may be more detrimental than the possible benefits of attending a high-ability school. This creates a dilemma for parents and is becoming more frequently encountered as dissatisfaction with public schools is apparently becoming stronger. Particularly for middle and upper-middle class families who live in inner-cities -- in Australia and the United States -- many parents must decide whether to send their children to local schools, where the school-average ability may be low, or to selective, high-ability schools. It is also important to note that the size of the BFLPE based on a representative sample substantially underestimates the size of the BFLPE relative to this particular decision between schools where school-average ability differences are very large. Similarly, based on in his study of college males Davis (1966) warned that "Counselors and parents might well consider the drawbacks as well as the advantages of sending their boy to a 'fine' college, if, when doing so, it is fairly certain that he will end up in the bottom ranks of his graduating class."

Marsh and Parker cautioned that a positive academic self-concept that is based on comparisons with the abilities of others in a low-ability school may not be maintainable in a different academic setting. Marsh (1984a) later described a dynamic equilibrium model in which academic achievement, academic self-concept, and attributions for the causes for academic success and failure are interwoven in a network of reciprocal relations such that a change in any one will produce changes in the others in order to reestablish

an equilibrium. For example, some students moving from a low-ability school to a high-ability school might lower their academic self-concepts, some might improve their academic performance, some might change their academic attributions so as to protect their previous academic self-concepts, and some might use various combinations of these possibilities. There is an important need for research about what actually happens when students move from one academic setting to a new academic setting where the average ability level is quite different, and about the individual characteristics that may determine how students will react to this stressful transition.

On the basis of the present investigation several hypotheses about the BFLPE are offered for further research. First, the BFLPE is primarily a function of school-average ability rather than school-average SES. Second, the size of the BFLPE will vary according to the variability of school-average ability in the particular sample. Third, the size of the BFLPE is smaller for older students (though I know of no actual empirical support for this hypothesis). Fourth, black/white differences in academic self-concept are primarily due to the BFLPE and not to response biases. Fifth, a similar sort of frame of reference effect affects the grades that are assigned to students in schools of differing school-average abilities; this effect is important inofitself and because it contributes to the BFLPE. Sixth, in longitudinal studies the BFLPE will have new influences in subsequent years beyond its initial effects. Seventh, academic self-concept causally influences subsequent school performance and part of this effect is due to the BFLPE.

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Table 1

Means and Standard Deviations For Total Group and Five Subgroups

Measures		Total (n=2213)	Whites in all white schools (n=1080)	Whites in mixed schools (n=832)	Blacks in non-white schools (n=169)	Blacks in mixed schools (n= 87)	Others (n= 45)	Percent Variance Explained
Time 1								
SES	Mn	50	50.5	51.5	41.4	47.0	42.7	7.3%**
	SD	10	9.7	9.6	8.8	10.4	9.4	
Ability	Mn	50	51.8	51.6	35.6	44.2	42.6	20.7%**
	SD	10	8.1	9.0	11.2	10.2	12.2	
	Diff		345	345	1245	123	123	
School-average-ability	Mn	50	51.8	50.8	35.6	48.8	48.2	56.2%**
	SD	5.6	3.0	3.7	6.6	4.6	4.3	
	Diff		2345	1345	1245	123	123	
School-average-SES	Mn	49.9	50.4	50.8	41.8	49.9	48.7	19.3%**
	SD	5.3	4.8	4.7	5.2	5.1	4.3	
	Diff		23	135	1245	3	23	
GPA	Mn	50	50.4	50.2	47.4	48.1	49.5	0.8%**
	SD	10	20.0	10.2	8.2	10.2	9.5	
	Diff		--	3	3	12	--	
Esteem	Mn	50	49.6	50.1	51.5	51.5	48.4	0.4%
	SD	10	10.0	10.1	9.5	9.4	10.9	
	Diff		--	--	--	--	--	
Academic self-concept	Mn	50	49.8	50.5	47.9	51.1	50.3	0.5%*
	SD	10	10.2	10.0	8.4	9.0	10.9	
	Diff		3	3	12	--	--	

(Table 1 continued on the next page)

Table 1 (continued)

Means and Standard Deviations For Total Group and Five Subgroups

Measures		Total (n=2213)	Whites in all white schools (n=1080)	Whites in mixed schools (n=832)	Blacks in non-white schools (n=169)	Blacks in mixed schools (n= 87)	Others (n= 45)	Percent Variance Explained
Time 2								
GPA	Mn	50.2	50.1	50.9	47.3	47.2	49.1	1.0%**
	SD	9.9	10.0	9.4	9.2	9.9	10.3	
	Diff		3	3	12	--	--	
Esteem	Mn	50.1	49.7	50.3	51.7	49.4	48.8	0.2%
	SD	9.9	10.0	9.6	9.8	10.7	11.0	
	Diff	--	--	--	--	--	--	
Academic self-concept	Mn	50.1	50.0	50.9	47.1	50.1	47.2	0.9%**
	SD	9.9	10.1	9.8	9.2	7.7	11.1	
	Diff		3	3	12	--	--	

Note. A one-way analysis of variance was used to compare the variable means for each of the five groups, and the percentage of variance explained ($SS_{effect}/SS_{total} \times 100\%$) is presented in the last column. When the F-ratio was statistically significant, Newman-Keuls tests (Nie, et al., 1975) were performed to test pair-wise differences and these are summarized in the rows labeled "Diff" (e.g., the "345" under group 1 for Ability indicates that group 1 differs significant from groups 3, 4 and 5, but not from group 2). Ability test scores, SES, academic self concepts, Esteem, and GPA were standardized to have means of 50 and standard deviations of 10 for responses for time 1 and/or time 2. The means and standard deviations for time 2 variables differ slightly from 50 and 10 because the standardization was done before the selection of cases described earlier. School-average-SES and ability were defined by assigning the school-average value to each student from that school.

* $p < .05$; ** $p < .01$.

Table 2

Correlations Among All Study Variables Time 1 (n= 2213; Below the Main Diagonal) and Time 2 (n=1672; above the main diagonal)

Measures	9	8	7	6	5	4	3	2	1	A	B	C
Time 1												
9 - Ability	(860)	421	482	549	425	418	449	189	518	431	157	522
8 - White[a]	431	(---)	256	595	776	336	089	-027	069	092	-018	075
7 - SES	489	251	(757)	399	237	523	219	135	332	246	097	326
6 - School-averg[- ability	561	612	400	(912)	757	753	111	008	121	112	-025	127
5 - %White[b]	433	795	231	771	(---)	419	078	-043	042	065	-044	065
4 - School-average- SES	425	348	528	757	438	(891)	068	023	129	077	-011	129
3 - GPA	433	081	245	113	076	058	(---)	247	515	657	201	477
2 - Esteem	186	-040	140	-009	-062	004	241	(750)	350	226	536	274
1 - academic self- concept	488	032	334	115	031	126	494	335	(685)	494	286	695
TIME 2												
A - GPA	399	072	228	098	053	063	647	240	481	(---)	232	519
B - Esteem	166	-022	093	-012	-035	-013	209	536	272	243	(760)	311
C - Acedemi[self- concept	505	079	331	140	076	139	461	280	686	498	313	(737)

Note. Correlations, presented without decimal points, below the main diagonal are based on all 2213 cases (r's > .04 are statistically significant at p < .05), while those above the diagonal are based on the 1672 cases selected for analyses of time 2 responses (r's > .05 are statistically significant at p < .05). The values in parentheses are reliability estimates for each variable as described in the text. The numbering of the variables corresponds to notation used in the path models presented in Tables 3 and 4 and Figures 1 and 2.

a -- Since this was scored 1=white, 0=black, positive correlations mean that whites had higher scores than blacks.

b -- %White was defined by assigning the percentage of white students in each school to all students in that school.

.. Appendix 1

Parameter Estimates For Models 1 -3 (See Figure 1) For the Total Group and for responses by White and Black Students

Parameters	Time 1			Time 2		
	Total (n=2213)	Whites (n=1912)	Blacks (n=256)	Total (n=1672)	Whites (n=1491)	Blacks (n=153)
Model 1						
r12.47	.305**	.305**	.330**	.294**	.302**	.176 *
p14	-.070**	-.053*	.005	-.057**	-.057 *	.091
p14[a]	-.132**	-.114*	.006	-.108**	-.120 *	.117
p17	.371**	.389**	.136	.356**	.353**	.168
p24	.191**	-.068 *	-.047	-.085**	-.068 *	-.041
p24[a]	-.182**	-.144*	.069	-.159**	-.142 *	-.061
p27	-.097**	.19**	.120	.141**	.134**	.150
p47	.528**	.482**	.552**	.523**	.459**	.673**
Model 2						
r12.69	.263**	.26**	.279**	.250**	.267**	.172 *
p16	-.232**	-.08**	-.092	-.228**	-.103**	.082
p16[a]	-.414**	-.244**	-.091	-.416**	-.315**	.075
p19	.619**	.616**	.348**	.647**	.638**	.135
p26	-.165**	-.066**	-.134	-.159**	-.084**	-.278**
p26[a]	-.293**	-.200**	-.145	-.290**	-.253**	-.296**
p29	.278**	.247**	.328**	.245**	.201**	.446**
p69	.561**	.372**	.578**	.548**	.34**	.641**

(Appendix 1 continued on the next page)

.. Appendix 1 (continued)

Parameter Estimates For Models 1-3 (See Figure 1) For the Total Group and for responses by White and Black Students

Parameters	Time 1 Total (n=2213)	Time 1 Whites (n=1912)	Time 1 Blacks (n=256)	Time 2 Total (n=1672)	Time 2 Whites (n=1491)	Time 2 Blacks (n=153)
Model 3[b]						
r12.34679	.217**	.219**	.236**	.203**	.222**	.129
p13	.312**	.289**	.248**	.327**	.319**	.150
p14	.042	.003	-.112	.022	-.003	.122
p14[a]	.079	.006	-.152	.041	-.007	.157
p16	-.229**	-.085**	.046	-.207**	-.095**	-.061
p16[a]	-.408**	-.258**	.046	-.378**	-.291**	-.056
p17	.132**	.132**	.050	.108**	.090**	.144
p19	.399**	.418**	.242**	.434**	.447**	.053
p23	.170**	.159**	.204**	.178**	.183**	.214 *
p24	-.009	-.025	-.195	-.002	-.010	.228
p24[a]	-.161	-.052	-.285	-.005	-.021	.339
p26	-.141**	-.053	.075	-.134**	-.073 *	-.455
p26[a]	-.252**	-.161	.081	-.245	-.218	-.484
p27	.084**	.087**	.040	.044	.044	.025
p29	.154**	.134**	.241**	.134**	.094**	.374**
p34	-.126**	-.14**	-.302	-.077 *	-.124**	.644 *
p36	-.115**	.002	.069	-.140**	.001	-.769**
p37	.116**	.116**	.020	.107**	.112**	-.069
p39	.495**	.473**	.366**	.489**	.462**	.301**
r46.79	.691**	.653**	.886**	.684**	.664**	.876**
p47	.42**	.450**	.388**	.418**	.423**	.489**
p49	.219**	.075**	.353**	.217**	.087**	.349**
p67	.165**	.192**	.293**	.176**	.179**	.346**
p69	.481**	.288**	.441**	.464**	.265**	.459**
r79	.489**	.438**	.466**	.482**	.418**	.527**

Figure 1. Path models 1 - 3 relating SES, ability, and GPA to academic self-concept and esteem. Results presented here are for the total sample of students at time 1. The corresponding path coefficients based on just white and just black students, and coefficients for time 2 data are presented in Appendix 1 for each model (see Table 2 for the numbering of the variables presented here and in Appendix 1).

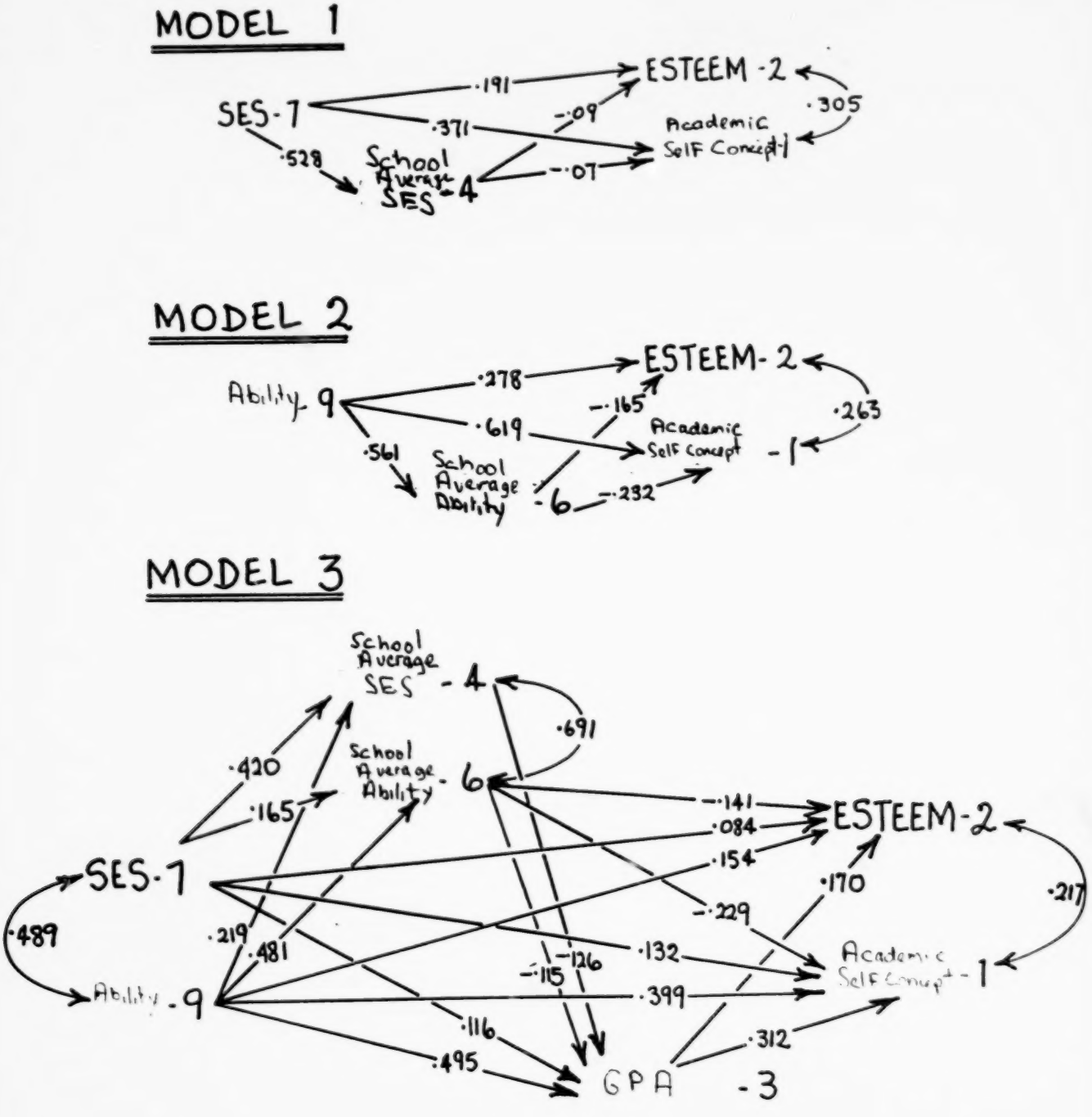

Figure 2. The longitudinal path model 4 that incorporates variables from times 1 and 2.